

REMARKS

Reconsideration of the above-identified application in view of the amendments above and the remarks following is respectfully requested.

The office action of June 16, 2006 acted upon claims 1-2 and 25-38. Claims 1-2 and 25-38 were rejected under 35 USC, section 103 (a). By this response, claims 1-5 and 25-38 have been canceled without prejudice, and new claims 39-61 have been presented in the belief that they recite allowable subject matter.

§ 103(a) Rejections

The Examiner has rejected claims 1, 2, 25-31 and 35-38 under § 103(a) as being unpatentable over Livingston (U.S. Patent No. 3,871,457) in view of Ballu (U.S. Patent No. 5,323,963). Claims 32-34 were rejected under § 103(a) as being unpatentable over Livingston in view of Ballu, and further in view of Kraft (U.S. Patent No. 2,593,315).

The Examiner's rejections are respectfully traversed. As argued in previous Responses, and as further developed in the below-referenced Interviews:

(1) Livingston teaches an automatic fire sprinkler that is, inherently, an on/off device.

(2) In this regard, Livingston is completely representative of all known, prior-art automatic fire sprinklers. This point was emphasized in the instant specification: "the K-factor in all prior art sprinklers is constant" (i.e., in an open position).

(3) Devices having variable orifices for controlling flow are known in the broad art of fluids handling and processing. Such devices are not known in the specific, mature, and extremely well-developed field of automatic fire protection systems.

(4) More specifically, the technical applications taught by Ballu for the variable orifice disclosed therein are not at all related to fire protection engineering.

(5) Until the instant invention, there existed no known motivation for combining an automatic fire sprinkler with an orifice that has a plurality of open positions, and that has a K-factor that is responsive to pressure in this plurality of open positions. No deficiencies in the known types of automatic fire sprinklers had been identified that would lead one skilled in the art to conceive and implement such an automatic fire sprinkler.

More specifically, nothing in the applied references supports the implementation of a pressure-based flow control unit within an automatic fire sprinkler system, so as to convert a conventional, automatic fire sprinkler into a fire sprinkler whose K-factor -- over a plurality of open orifice positions -- depends on the inlet water pressure.

(6) The problem solved by Livingston requires an on/off mechanism. Any intermediate open position(s) would appreciably detract from the function of the sprinkler.

(7) Conventional wisdom and teachings on automatic fire sprinkler systems (see, by way of example, pages 10-13 of the instant Specification, which cites the NFPA 13 Standard for Installation of Sprinkler Systems, 2002 edition, as well as the Automatic Sprinkler Systems Handbook) teach away from the present invention, emphasizing that sprinkler orifices should be as large as possible in order to both improve the extinguishing performance and to reduce the amount of discharged water (and reduce damage due to water). The present invention teaches a device designed such that the orifice diameter, and consequently, the flow of water are deliberately reduced when the

water pressure in the system drops below a particular value. Surprisingly, and in sharp contrast to what had been taught in the art over decades, automatic fire sprinkler systems utilizing the inventive sprinkler devices exhibit improved extinguishing performance and a reduced amount of discharged water, by virtue of the reduction in orifice diameter of the self-adjusting orifice.

(8) It must be emphasized that commercial automatic fire sprinkler systems were first developed over 120 years ago, and practice is widespread. The technology behind such systems is well developed and extremely mature.

(9) Applicant has shown in the instant specification, and has argued, that the cost of such fire sprinkler systems could be reduced using the inventive sprinklers, while -- at the same time -- improving safety and reducing damage due to fire and due to excessive use of water of prior-art systems.

(10) In the field of automatic fire sprinkler systems, life safety, damage control, and capital expenditure are of cardinal importance. In the 30 years that have elapsed since Livingston issued, there is no known device, and certainly no commercially-implemented device, which attempts to solve the problems described in the instant Specification. More specifically, there is no commercially-implemented device that attempts to solve these problems using the art taught by Livingston.

(11) The device of the present invention has been accepted for publication in one of the prestigious journals of fire protection engineering. Experts in the field of fire protection engineering have concluded that the device represents an inventive, technological break-through in a mature, well-developed field.

While continuing to traverse the Examiner's rejections, the Applicant has, in order to expedite the prosecution, chosen to compose new independent claim 39 in order to clarify and emphasize the crucial distinctions between the device of the present invention and the prior art cited by the Examiner. Thus, the orifice structure has been limited to a self-adjusting orifice that is directly responsive to water inlet pressure. By sharp contrast, the variable orifice of Ballu is a CPU/externally controlled device. The variable orifice of Ballu is not self-adjusting, nor is it directly responsive to inlet fluid pressure.

As discussed hereinbelow with regard to the second Interview Summary, Applicant believes that new independent claim 39 completely overcomes the Examiner's rejections on § 103 grounds.

Interview Summaries

In an interview conducted with Examiner Nguyen on 8 November 2006, a number of issues were touched upon, including Applicant's proposed amendment of the claims. The Examiner articulated that the proposed independent claims 39 and 45 contained functional language. The Examiner also disclosed several references that might read on the newly added claims: U.S. Patent Nos.: 3,479,001; 3,759,331; 4,308,885; 4,359,098, and 5,263,607. Applicant argued that the inventive concept was of an extremely broad nature, and that the language was as structural as necessary to embody the inventive concept in an independent claim while structurally distinguishing between the instant invention and the cited prior art.

With regard to U.S. Patent Nos. 3,479,001; 3,759,331; 4,308,885; 4,359,098, and 5,263,607, Applicant accepted responsibility to carefully review the patent documents to determine if any of the references might read on the newly added claims.

In a subsequent interview conducted with Examiner Nguyen on 21 November 2006, a number of issues were touched upon, including Applicant's proposed amendment of the claims and the Examiner's proposed language for the claims.

Regarding the added structural limitations directed towards (1) a self-adjusting orifice and (2) an orifice that is directly responsive to water inlet pressure, it is Applicant's understanding that agreement was reached with the Examiner that either one of these limitations patentably distinguishes between the instant invention as claimed and the cited prior art, and indeed, any teachings of self-adjusting orifices that are outside the well-define field of fire protection engineering.

In response to the Examiner's proposed language for the independent claim, Applicant articulated that the claim language was intended to exclude any components of automatic fire sprinkler systems from the structural language of the independent claim(s). Applicant went on to explain that the instant invention can be used in conjunction with conventional automatic fire sprinkler systems, and with conventional fittings to connect the inventive device to such systems. Applicant also articulated that the invention is an automatic fire sprinkler device that could be manufactured and sold separately from automatic fire sprinkler systems. Since the automatic sprinkler device – as claimed – is

patently distinct from the cited prior art, Applicant steadfastly maintains that there is no need to structurally include various conventional components of automatic sprinkler systems within independent claim 39.

It is Applicant's understanding that agreement was reached on this issue.

New Claims

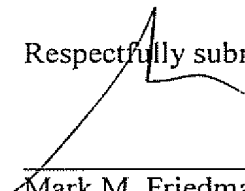
New claims 39-61 draw support from the instant Specification and from the original set of claims. Support for various limitations has been provided in previous Office Action Responses.

Additional Prior Art References

The Examiner has made of record various patent documents that were not relied upon, but might be considered pertinent to the instant disclosure (please refer to the Interview Summary of 8 November 2006). Applicant has carefully reviewed these documents and believes that they do not render the claimed invention unpatentable. In at least some instances, these documents tend to indicate the non-obviousness of the invention.

In view of the above amendments and remarks it is respectfully submitted that claims 39 - 61 are in condition for allowance. Prompt notice of allowance is respectfully and earnestly solicited.

Respectfully submitted,



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